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IMPLEMENTATION OF LEARNING THEORY INTO CLASSROOM PRACTICE

Dr. Justus A. Prentice

Board of Cooperative Educational Services
First Supervisory District, Erie County
October 1, 1968

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Board of Cooperative Educational Services
First Supervisory District, Erie County
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Introduction

I. Statement of the Problem Under Study

The problem under study in this project can best be summarized in the following brief paragraph by Gage:

> First, the limited usefulness of learning theory in education has long been acknowledged. Estes, writing on "learning" in the Encyclopedia of Educational Research, judged that "no convergence is imminant between the educator's and the laboratory scientist's approaches to learning," and he was able to report little progress "toward bridging the gap between laboratory psychology and the study of school learning". Near the close of his Theories of Learning, Hilgard stated: ". . .it is not surprising, therefore, that the person seeking advice from the learning theorist often comes away disappointed." Educational psychology textbooks usually include treatments of learning the dra in general terms upon learning theories. But these treatments bear only slight resemblance to the elaborations of the theories as portrayed in Hilgard's book.[1]

The problem of relating theories of learning to sound educational practice has existed throughout the history of education. The reason why educators failed to heed the advice of learning psychologists are many. The literature tracing the history of psychology related to education point to many reasons for this failure without identifying a single cause. The significant point to be gleaned from this history, however, is that educators can no longer fail to heed the knowledge which has been gained about the learning processes if education is to keep pace with the demands of an ever changing society.

The problem was, therefore, to identify and employ in classroom teaching, through a pilot program of inservice education and workshops, those principles of educational psychology which have been proved effective in experimental situations. The essense of this problem was to develop a method(s) by which principles of learning could successfully be transferred to actual classroom practice.

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[1] N. L. Gage, "Theories of Teaching," Theories of Learning and Instruction, the 63rd Yearbook of the National Society for the Study of Education, Part I, Chicago: the Society, 1964, p. 268.

Many authors are currently stressing the importance of implementing sound learning theory into classroom teaching. Notable among these are Bugelski,[2] Bruner, Clayton, Cronbach, Klausmeier and Stephens. The Association for Supervision and Curriculum Development devoted the entire 1966 yearbook to this important topic.[3] With leadership of this kind, there is a mandate to the schools to do what we can to use current learning theory.

This report covers the second year of the original project. Stated more concisely than above, the objectives of the second year were:

1. To continue the development of the procedures, guidelines, and methods for implementing principles of learning into classroom teaching.
2. To develop a short term inservice education course to enable practicing teachers to utilize the above mentioned methods.
3. To test, experimentally, the results of training inservice teachers for the implementation of learning principles into classroom teaching.

While pupil achievement is the central concern of the school, and likewise of concern to this project, efforts to obtain reliable scores on this attribute proved fruitless. Therefore, the major hypothesis

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[2]B. R. Bugelski, The Psychology of Learning Applied to Teaching (The Bobbs-Merrill Company, Inc., 1964). Jerome S. Bruner, Toward a Theory of Instruction (Cambridge: The Belnap Press of Harvard University Press, 1966). Thomas E. Clayton, Teaching and Learning (Englewood Cliffs: Prentice-Hall, Inc., 1965). Lee J. Cronbach, Educational Psychology (New York: Harcourt, Brace & World, Inc., 1963). Herbert J. Klausmeier, "Patterns For Learning," a paper read to the Joint Conference, Council of School Superintendents and New York State Association of School District Administrators (Rochester, New York, September 29 through October 1, 1965). Mimeographed. John M. Stephens, The Psychology of Classroom Learning (New York: Holt, Rinehart and Winston, Inc., 1966).

[3]Association for Supervision and Curriculum Development, Learning and Mental Health in the School, 1966 Yearbook (Washington, D. C.: The Association, 1966).

which was used stated that the instructional behavior, as measured by an Instruction Observation Record (Appendix A-1 to 8), of the experimental teachers receiving the proposed inservice course would change to a significantly greater degree after treatment than would the instructional behavior of control group teachers.

Procedures

Subjects Involved

In order to accomplish the above stated objectives, the following procedures were employed in this project. The first group of project teachers (Appendix B-1) continued to meet as a group for the purpose of refining and improving the suggested procedures for implementing principles of learning into classroom practice. This step involved the continued emperical testing of the initially proposed procedures, and appropriate revisions, additions, and deletions. In addition, a carefully planned thirty hour program of inservice instruction was prepared by this group (this program is described in the next section). The earlier work resulted in the development of a reference booklet which was to be used by the experimental group in the inservice training program (Appendix C).

During the first semester of 1967-68 two other groups of teachers were also selected to participate in the program. These participants were selected to take part in an experimental study to ascertain the effectiveness of the work done to that time. Their selection was accomplished with a randomized block design to control for the variables of sex, grade level, and subject area taught. By randomly selecting four blocks, the groups to be utilized in this phase of the project were ascertained. These blocks were: primary grade, female language arts teachers; intermediate grade, male science teachers; junior high school, female mathematics teachers; and secondary school, male social studies teachers. It was further determined that ten subjects would be selected for each block and randomly assigned to either the experimental treatment group or the control group. This was accomplished, although the initial selection of ten teachers per group had to be a random selection of teachers from eighteen school districts who had consented to participating if chosen. All random selections and assignments were made with a Table of Random Numbers. The initial group, therefore, consisted of forty subjects, twenty experimental and twenty control.

Of these, eighteen experimental teachers and thirteen control teachers completed the study.

Educational Treatment

The original project teachers (Appendix B), along with the Director of Curriculum Development, prepared a thirty hour training program during the first semester of 1967 to 1968. This training program used the Reference Booklet (Appendix C) along with several other media and approaches. The purpose of this program was to provide the participating teacher with the necessary knowledges and skills to implement learning principles into classroom practice. To discover if this could be accomplished, half of the newly selected group was assigned to the experimental treatment and were brought to the Learning Resource Center of the Board of Cooperative Educational Services for thirty hours of intensive training on released time from school. Prior to the training, however, both the experimental teachers and control teachers were observed with the Flander's Verbal Interaction Analysis (1) and an Instruction Observation Record (Appendix A) developed by Hilliard Jason (2). In addition, the pupils were tested with the Stanford Achievement Test on the appropriate grade level and in the appropriate subject - language arts, science, mathematics, or social studies.

The syllabus for the thirty hour training program was planned in advance to accomplish the achievement of many objectives in a short period of time. The objectives for each session is listed below along with the instructional procedures used for each session. The content of each session can easily be inferred from the objectives and learning procedures and the evaluation was deferred until the post testing to ascertain the achievement or non-achievement of the objectives. Each session included a coffee break for the participants:

First Session - Five hours

Objectives:
1. To converse freely with other participants.
2. To recognize certain words common to teaching and learning.
3. To accept the existence of a knowledge of how people learn.
4. To identify the purposes and procedures. for the thirty hour inservice training session.

Activities:	1.	Introductions.	1/2 hour
	2.	Statement of overview and purpose of course.	1/2 hour
	3.	Discussion of some pertinent readings and terms.	3/4 hour
	4.	Lecture on history of learning theories.	1 hour
	5.	Question period.	1/2 hour
	6.	Small group goal setting.	1 hour
	7.	Summarizing discussion.	3/4 hour

Materials: 1. Glossary of terms:

Interaction analysis
Learning principles
Structured learning
Jean Piaget
B. F. Skinner
E. L. Thorndike
Cognitive
Affective
Psychomotor
Individual differences
Teaching-learning situation
Stimulus-response learning (S-R)
Phenomenological field
Taxonomy of objectives
Questioning strategies
Behavioral objectives
Performance criteria
Goals
Evaluation
Learner characteristics
Cognitive psychologists
Gestalt psychology
Reinforcement
Concepts
Developmental tasks
Motivation

2. Bibliography:

Berelson, B. and Steiner, G. A. Human Behavior, An Inventory of Scientific Findings. Harcourt-Brace, 1964.

Bugelski, B. R. The Psychology of Learning Applied to Teaching. Bobbs-Merrill Company, 1964.

Clayton, Thomas E. Teaching and Learning: A Psychological Perspective. Prentice-Hall, 1965.

Hilgard, Ernest (ed.) Theories of Learning and Instruction. 63rd Yearbook of the National Society for the Study of Education. University of Chicago Press, 1964.

Havighurst, Robert. Human Development and Education. Longmans, Green and Company, 1953.

Stephens, J. M. The Psychology of Classroom Learning. Holt, Rinehart and Winston, 1965.

Mowrer, O. H. Learning Theory and Behavior. John Wiley and Sons, 1960.

Taxonomy of Educational Objectives. David McKay Company. Handbook I: Cognitive Domain - Bloom, B. S., et, al., eds, 1956. Handbook II: Affective Domain - Krathwahl, D., ed. 1964.

Travers, R. M. W. Essentials of Learning: An Overview for Students of Education. MacMillan and Company, 1963.

Waetjen, Walter B. and Leeper, Robert R. (eds.). Learning and Mental Health in the Schools. 1966 Yearbook of the Association for Supervision and Curriculum Development. The Association, 1966.

Second Session - Three hours

Objectives:

1. To recall the four stages of development defined in Piaget's developmental theories.
2. To interpret the meaning of "Learning is a structured process."

Activities:

1.	Lecture on Piaget's Developmental Theories (video-tape).	1 hour
2.	Large group discussion of Piaget's theories.	3/4 hour
3.	Lecture and discussion of an application of these theories in a classroom situation	3/4 hour

4. Question period. 1/4 hour

Materials:

1. Video tape of Dr. Aubrey Roden on "Piaget" B.O.C.E.S. video tape library.
2. Bibliography:

The Language and Thought of the Child. Translated by Marjorie Worden. New York: Harcourt, Brace and World, 1926.

Judgment and Reasoning in the Child. Translated by Marjorie Worden. New York: Harcourt, Brace and World, 1928.

The Child's Conception of the World. Translated by Joan and Andrew Tomlinson. New York: Harcourt, Brace and World, 1929.

The Child's Conception of Physical Causality. Translated by Marjorie Worden Gabian. New York: Harcourt, Brace and World, 1930.

The Moral Judgment of the Child. Translated by Marjorie W. Gabian. New York: Harcourt, Brace and World, 1932.

The Origins of Intelligence in Children. Translated by Margaret Cook. New York: International University press, 1952.

The Construction of Reality in the Child. Translated by Margaret Cook. New York: Basic Books, 1954.

Play, Dreams and Imitation in Childhood. Translated by C. Gattegno and F. M. Hodgson. New York: Norton, 1951.

The Psychology of Intelligence. Translated by M. Piercy and D. E. Berlyne. London: Routledge and Kegan Paul.

Logic and Psychology. Translated by W. Mays and T. Whitehead. Manchester University Press. New York: Basic Books.

Remarks About Himself. In J. M. Tanner & Barbel Inhelder (eds.) Discussions on Child Development. (Proceedings of the First Meeting of the World Health

Organization Study Group on the Psychological Development of the Child). New York: International University Press.

The Development of Time Concepts in the Child. In P. H. Hoch and J. Zubin (eds.), Psychopathology of Childhood. New York: Grune and Stratton.

The Child's Conception of Geometry. by Jean Piaget and Barbel Inhelder. Translated by E. A. Lunzer. New York: Basic Books, 1960.

The Child's Conception of Number. by Jean Piaget and Alina Szeminska. Translated by C. Gattegno and F. M. Hodgson. New York: Humanities Press, 1952.

Diagnosis of Mental Operations and Theory of Intelligence. Jean Piaget and Barbel Inhelder. American Journal of Mental Deficiency.

The Child's Conception of Space. by Jean Piaget and Barbel Inhelder. Translated by F. J. Langdon and J. L. Lunzer. London: Routledge and Kegan Paul, 1956.

The Growth of Logical Thinking from Childhood to Adolescence by Alina Szeminska, Jean Piaget and Barbel Inhelder.

3. "Piaget Rediscovered," A Report by Eleanor Duckworth (Appendix D).

Third Session - Two hours

Objectives:

1. To recognize the type of pupil data which is worthy of recording in a pupil file.
2. To utilize data about learner characteristics in making decisions about a teaching-learning situation.
3. To experiment with various approaches for the individualization of instruction.

Activities:

1. Illustration of pupil data keeping. 1 hour
2. Lecture on utilizing data on learner characteristics. 1/2 hour
3. Review of several plans for individualizing instruction such as: AAAS Science: A Process Approach, I.P.I., C.B.R.U., Duluth Plan, and Project P.L.A.N. 1/2 hour

Materials: Only as needed. . . . . .

Fourth Session - Three hours

Objectives:

1. To recognize a cognitive theory of how people learn.
2. To extrapolate from this theory a design for making instructional decisions.
3. To use all available resources to improve instructional decision making.

Activities:

1. Lecture on a cognitive field theory of learning (video-tape). 1 hour
2. Discussion of instructional model and its implication. 1 hour
3. Questions and independent work with worksheet (Appendix E). 1 hour

Materials:

1. Video-tape of Dr. Thomas Clayton, Board of Cooperative Educational Services video-tape library.
2. Worksheet (Appendix E).

Fifth Session - Two hours

Objectives:

1. To identify levels of questioning in a specific questioning strategy.
2. To utilize a strategy for asking questions in the classroom.

Activities:

1. Presentation and discussion of a taxonomy. 1 hour
2. Answering and constructing questions in a taxonomy. 1 hour

Materials:

1. Transparency of a Taxonomy of Questioning (Appendix F).
2. Sanders, Norris M. Classroom Questions: What Kinds? New York: Harper and Row, 1966.

Sixth Session - Five hours

Objectives:
1. To recognize how to use an interaction analysis in the classroom.
2. To use a Verbal Interaction Analysis.
3. To recognize the need to increase interaction in the classroom.

Activities:
1. Lecture on meaning of interaction and interaction analysis. 1/2 hour
2. Presentation of Flander's Verbal Interaction Analysis (video-tape) 1 hour
3. Actual demonstration of Verbal Interaction Analysis with students. 3/4 hour
4. Discussion of Demonstration. 3/4 hour
5. Making and using interaction analysis independently on the total group or self. 2 hours

Materials:
1. Video tape of Dr. Ned A. Flanders, Board of Cooperative Educational Services video-tape library.
2. Hough, John B. "How to Improve Your Teaching." Education Age. September - October, 1967. p. 13.
3. Flanders, Ned A. Studying Teacher Influence. A series of five color film-strips with sound on tape. Audio-Visual Education Service, University of Minnesota. Parts 3 and 4.

Seventh Session - Three hours

Objectives:
1. To recognize the importance of stating instructional objectives.
2. To recognize the elements of a behaviorally stated objective.
3. To write behavioral objectives.

Activities:
1. Teacher-led small group discussion of why and how to write instructional objectives. 1 1/2 hours
2. Large group discussion and questions. 3/4 hour
3. Independent writing of behavioral objectives. 3/4 hour

Materials:

1. Mager, Robert F. Preparing Instructional Objectives. Palo Alto: Fearon Publishers, 1962.
2. Pophan, James. Educational Objectives filmstrip and audio tape. Los Angeles: Vimcet Associates, 1967.

Eighth Session - Two hours

Objectives:

1. To recognize the value of utilizing sound learning principles to improve teaching and learning.
2. To synthesize the thirty hour course.
3. To evaluate the thirty hour course.

Activities: Large group discussion of week's activities. 2 hours

Materials: None

The entire curriculum contained in the above syllabus was implemented by ten of the members of the original project. All members of the original group volunteered and those who had exhibited a special interest in one of the areas included in the syllabus were selected to work on that portion of the course.

As an additional effort to assure future success of the program, most sessions were followed by an evaluation form. The form consisted of three questions to be answered on a continuum and open-ended questions. The three objective response type questions and a summary of responses is presented below. The responses are a total for all sessions.

Question #1: Was the content of the session commensurate with the goals for the session?

Responses:

Highly Related	- 119
Somewhat Related	- 19
Indifferent	- 0
Poorly Related	- 0
Not Related at All	- 0

Question #2: Do you feel the method of instruction (lecture, discussion, etc.) was appropriate for the goals of the session?

Responses:

Highly Appropriate	- 92
Somewhat Appropriate	- 46
Indifferent	- 1
Hardly Appropriate	- 2
Not Appropriate	- 0

Question #3: How useful was the chosen media or materials in helping you achieve the goals of the session?

Responses:

Highly Useful	- 77
Somewhat Useful	- 46
Indifferent	- 2
Hardly Useful	- 4
Not Useful	- 0

Instrumentation

Pre-testing was done with an Instruction Observation Record, (Appendix A), Verbal Interaction Analysis,(1) and Stanford Achievement Tests. This was accomplished three weeks prior to the thirty hour course. Subsequent to the course, the investigator post-tested the experimental and control subjects with the same instruments, using different forms of the Stanford Tests. The post-testing occurred approximately five months after the experimental treatment. Thorough post-testing with the Stanford Achievement Tests was precluded due to a lack of understanding of the project on the part of the control group teachers. Therefore, the data used for this comparison represents only fifteen of the original forty classrooms in the study. Further, losses due to uncontrollable circumstances resulted in a post-test population of eighteen experimental group teachers and thirteen control group teachers on the observation scale.

Data Analysis

Only two of the test measures were found to be useful for data analysis. The Verbal Interaction Analysis did not lend itself to statistical analysis. However, the other two measures were appropriately tested with a t test of mean scores. The null hypothesis was used in both cases and the level of confidence was set at .05. For each of the two measures, a t test was calculated for differences on the pre and post data for both experimental and control groups.

In all four analysises, an F test was first calculated to determine homogeneity of variances. Because they were not significantly different for their appropriate degrees of freedom, and because the sample size of the groups being tested was equal in each case, the investigator used the pooled variance formula with degrees of freedom equal to $n_1 + n_2 - 2$ to test each null hypothesis of equal means between groups.

Results

Instruction Observation Record

On the Instruction Observation Record (IOR), the investigator hypothesized that the thirty hour training program for teachers would result in a change of their classroom behavior as measured by a mean score of several rating scales. The pre-test scores on the IOR for the experimental group (14:33) and the control group (14.39) were compared; however, since they were nearly identical a statistical comparison appeared unnecessary. This similarity led the investigator to conclude that they were, in fact, equal on pre-test scores of the IOR. Hence, the control group was tested to ascertain if changes occurred in IOR scores over time (Ho: $X_1 = X_2$).

Control Group IOR Scores

Subject	Pre-test Scores	Post-test Scores
1	10.00	11.66
2	13.71	15.28
3	13.17	15.00
4	17.00	16.66
5	16.66	18.42
6	13.85	15.00
7	15.28	15.85
8	13.83	15.16
9	15.43	16.85
10	14.50	17.00
11	15.66	10.16
12	13.66	15.83
13	14.28	15.14

The post-test mean score (15.23) and the pre-test mean score (14.39) of the control group were compared with a pooled variance t model. The resulting t score, with 24 degrees of freedom, was 1.08 - not significant at the .05 level of confidence (2.064 needed @ .05 level). This failure to achieve significance indicates that the control group did not change over time, as measured by the IOR, and, therefore, the experimental groups were similarly tested for changes (Ho: $X_1 = X_2$)

Experimental Group IOR Scores

Subject	Pre-test Scores	Post-test Scores
1	16.17	19.14
2	6.66	16.14
3	15.28	18.85
4	14.00	16.00

5	17.14	15.42
6	15.50	17.42
7	10.83	12.85
8	16.28	16.00
9	15.33	16.33
10	15.00	18.85
11	15.00	17.14
12	14.66	16.66
13	14.57	17.14
14	15.85	18.82
15	10.83	12.00
16	12.16	16.22
17	16.14	18.57
18	16.66	19.00

The post-test mean score (16.80) and the pre-test mean score (14.33) of the experimental group were compared with a pooled variance t model. The resulting t score, with 34 degrees of freedom was 3.16 - significant beyond the .01 level of confidence (2.73 needed @ .01 level). Hence, the null hypothesis was rejected and the investigator concluded that changes in the experimental group had occurred over time and subsequent to the thirty hour training period.

Achievement Tests

A comparison of pre-test means on the achievement tests, 42.09 for the control group and 30.99 for the experimental group, produced a t score of 5.09 which, with 13 degrees of freedom, was sufficient to reject the null hypothesis and conclude that the means of the two groups were different prior to treatment. However, this difference favored the control group which, in fact, scored lower on the post-test than they had on the pre-test.

Control Group Achievement Scores

Subject	Pre-test	Post-test
1	44.90	49.89
2	44.54	42.96
3	31.50	29.85
4	36.60	32.00
5	51.92	50.93

On the other hand, a comparison of the pre-test and post-test scores for the experimental group showed a different tendency.

Experimental Group Achievement Scores

Subject	Pre-test Scores	Post-test Scores
1	45.12	44.50
2	14.77	54.95
3	29.17	46.79
4	40.40	41.54
5	13.29	35.56
6	40.18	40.05
7	34.12	31.32
8	21.18	27.18
9	51.73	54.37
10	19.91	30.70

A t test of the pre-test mean (30.99) and the post-test mean (40.70) produced a t score of 5.71 which, with 18 degrees of freedom, was significant beyond the .01 level of confidence. This would indicate that the null hypothesis should be rejected in favor of the hypothesis that the achievement scores for this group were significantly different after treatment whereas the control group had actually gone down in their scores. However, this interpretation is treated most cautiously by the investigator because of some extremely peculiar and unexplainable scores between pre-testing and post-testing for this group. Nevertheless, some evidence would appear to exist in the direction of showing differences favoring the experimental group.

Conclusions and Recommendations

The data cited above would appear to support the major hypothesis of this study. Namely, that the thirty hour training program presented to the experimental teachers has resulted in a change in their instructional behavior as measured by an Instruction Observation Record. Additionally, a comparison of achievement scores on the Stanford Achievement shows a significant improvement in achievement for the experimental group while the control group actually scored lower on the post-test than on the pre-test. However, the investigator views this last result guardedly and hesitates to make any definite conclusions based upon it. The investigator does, on the other hand, base some of his recommendations on the same findings with a warning that they may be based upon questionable data.

All in all, the results of the study would strongly support further investigation into this project. Even ignoring any questionable data on pupil achievement, the data which reflects changed teacher instructional behavior seems sufficient to continue investigation into this area. Educators

have long maintained that a knowledge of principles of learning is important to the classroom teacher. By the same token, they have had to face the sad fact that this knowledge is frequently lacking. This study brings to bear on this feeling that a knowledge of learning principles does seem to change teachers' behavior and, perhaps, even result in greater achievement on the part of the learners.

A strong recommendation of the investigator would be that the same thirty hour inservice course which is outlined in this report should be duplicated with several groups of teachers during the 1968-69 school year. Some of these duplications should be utilized to further study the results on teacher behavior and pupil achievement of the course. Other versions of the course might likewise be tried and tested. For example, thirty hours may well be split up over a five week period, meeting for six hours on five consecutive Saturdays. The results of allowing a week between several of the sessions would be a fascinating study. In any event, the sessions should probably be continued for larger numbers of teachers with some concomitant research.

Another major recommendation is the continued development and refinement of the booklet which appears in the appendix of this report. This edition appearing in the appendix was not intended to be a finalized document. Rather, much additional development and testing was planned from the beginning. This coming school year should be partially devoted to this field testing and revision while some attention should be given to dissemination of much of the information contained in the booklet.

Finally, as a result of his experience with the project, the investigator would recommend that further study of psychological principles of learning and development be highly related to the practical considerations of the classroom setting. Further, that these investigations be carefully tested in the classroom setting, both expirically and experimentally.

Summary

The purpose of this project was to develop guidelines for teaching which would implement into the classroom some of what is known about learning. A booklet of suggestions was prepared in the first year of the project and a thirty hour training program to accompany the booklet was developed in the second year. The development of both of these phases was accomplished by a group of approximately twenty teachers from several grade levels and subject areas in the schools of the First Supervisory District of Erie County, Buffalo, New York

During the second year of the project, the year which is the subject of this report, a new group of teachers was brought together for the thirty hour training program. Another group of teachers were selected as control teachers who would not receive the thirty hours of training. These two groups were compared both before and after treatment with classroom observations and achievement tests. The resulting data strongly favored the experimental teachers in changed instructional behavior and gave some indication that the pupils of the experimental teachers achieved to a higher degree than did those of the control teachers.

The results of the study led the investigator to make three major recommendations. First, that the same thirty hour inservice course be given to several different groups of teachers in the coming year and that research on several aspects of the program be conducted with some of the groups receiving the training. Second, that the original project teachers continue their efforts to revise and improve the basic document which accompanies the thirty hour training program. Finally, the investigator recommends that future study of learning principles be related to the actual classroom situation in its most concrete form.

References

1. Flanders, Ned A. Teacher Influence, Pupil Attitudes, and Achievement. Cooperative Research Monograph, No. 12, U. S. Department of Health, Education, and Welfare, Office of Education. Washington, D. C.: U. S. Government Printing Office, 1965.

2. Jason, Hilliard. A Study of Teaching Practices in Selected Medical Schools. Unpublished doctoral dissertation, State University of New York at Buffalo, 1961.

APPENDIX A

INSTRUCTION OBSERVATION RECORD

INSTRUCTION OBSERVATION RECORD

Teacher (name) Miss Carol Lexer

School Clarence Jr. High

Location (city or town) Clarence, New York

Class type

a. _____ small group, informal
b. _____ small group, formal
c. x large group, informal
d. _____ large group, formal

Profile of Scores

1. 15
2. _____
3. 15
4. 15
5. 16
6. 16
7. 14

6 | 91

15.16 = $\overline{X}$

Number of minutes observed 20 Date 6/7/68

Observer Code JEE.

(1) ATTITUDE TO DIFFERENCE

1	A		
			Rejects questions that reflect poor understanding on the part of the pupil. Insults a pupil who disagrees.
2	B		
3	C		
4	D		
5	E		
			Indicates by inuendo and gesture that differences are not desirable. Without directly saying so, makes it clear to the pupils that disagreement is discouraged.
6	F		
7	G		
8	H		
9	I		
10	J		
11	K		
12	L		
			Without showing much pleasure or displeasure, deals patiently with disagreements, and with differences in degrees of understanding.
13	M		
14	N		
15	O		
		x	
16	P		
17	Q		
			Actively encourages group disagreement and discussion. Reacts to criticism with interest and understanding. Encourages individuals to express their points of view.
18	R		
19	S		
20	T		

Insufficient evidence.

Inappropriate for this session

COMMENTS AND ANECDOTAL EVIDENCE (Use back of sheet)

(2) SENSITIVITY TO PHYSICAL SETTING

A	
B	No attention is paid to the physical comfort or needs of the pupils, in terms of; need for temperature change, better viewing; short recess, etc.
C	
D	
E	
F	
G	Goes through the motions of checking some of the physical aspects, such as lighting and temperature. Once involved in the activity, pays no attention to the setting, unless the disturbing factor is extreme.
H	
I	
J	
K	
L	While involved in the activity, is aware of the more obvious factors that influence the class setting. May correct a disturbing influence such as a developing draft, or may provide a needed recess, but does not recognize the less obvious, such as light glare on desks or chalkboard.
M	
N	
O	
P	
Q	Assures that each pupil can hear all that is said, can see all that is written or shown, and is comfortable. Within the physical limitations of the room, placement of both furniture and pupils is utilized to maximum advantage.
R	
S	
T	

X		Insufficient evidence
Y	X	Inappropriate for this session

COMMENTS AND ANECDOTAL EVIDENCE...(Use back of sheet).

(3) ATTITUDE TO PUPILS

A
B — Activity hostility to pupils is evident. Derogatory remarks are used, and an air of austere formality pervades the situation.
C
D
E
F
G — In general, there is an approach of indifference to the pupils. The teaching seems to be a matter of course, and very little interaction - verbal or otherwise - takes place; other than the formal, information-getting variety.
H
I
J
K
L — The atmosphere is a moderately relaxed one. The teacher tends to greet pupils in a friendly manner. During the class, a personal comment, pleasantry, or shared joke is not considered out of place.
M
N
O
X
P
Q — Acceptance, friendliness, and warmth can be sensed at all times. Without necessarily being an accomplished humorist, the teacher sets a happy tone in interaction with pupils. The teacher's interest in the pupils is readily felt.
R
S
T

X — Insufficient evidence

Y — Inappropriate for this session

COMMENTS AND ANECDOTAL EVIDENCE (Use back of sheet)

(4) USE OF INSTRUCTIONAL MATERIALS

Types of Materials

A. Chalkboard
B. Charts, Diagrams, etc.
C. Demonstrations
   a. models, globes
   b. maps
   c. science equipment
D. Tests
E. Motion pictures
F. Filmstrips, slides
G. Overhead projector
H. Opaque projector
I. Duplicated Material
J. Community resources
K. Tape recorder
L. Texts, references
M. Other (specify)
   1. _____
   2. _____

Analysis of Materials Used

1. Specific materials used (code letter, above)
2. Percentage of observed class time devoted to each.
3. Code letter for "effectiveness" (below).

a	b	c
I	A	
60	40	
0	0	
15	15	

Effectiveness of Materials

15 x 60 = 900 15 x 40 = 600

A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T

The material is poorly adapted to the situation, no introductory explanation is given, and no discussion accompanies or follows its presentation. It does not serve the purpose for which it was selected.

Material largely inappropriate, but some value is derived from the explanation and discussion that accompanies it. Or, there may be little attempt at elucidation although the material itself is sufficiently effective of its own right to lend value to its presentation.

The specific material, and the use to which it is put, appear fairly well geared to the apparent objectives in having employed it. There are some limitations, e.g., projected slides may be appropriate and well explained, but too cluttered to be readily understood.

Material is well adapted to the apparent objectives of the lesson, its significance is made very clear, and the discussion during or following its use serves to highlight it.

X Insufficient evidence.

Y Inappropriate for this session

COMMENTS AND ANECDOTAL EVIDENCE (Use back of sheet)

(5) REACTION TO STUDENTS' NEEDS

A

B — The teacher forges ahead with the lesson, rejecting pupil attempts at comments or questions. No consideration is given to whether or not the speed of presentation or the subject matter is actually geared to pupils' interests and needs.

C

D

E

F

G

H — The teacher restricts the presentation to just the material prepared. However, more time is spent in attempting to explain material the teacher believes is difficult for the pupils. No opportunity is provided for pupils to ask questions.

I

J

K

L

M — Flexibility is evident, and an effort is made to properly explain points of difficulty, brought up by the pupils. May fail to recognize more subtle pupil reactions, such as waning interest, or pupils asking questions of each other.

N

O

P X

Q

R — Repeatedly checks to insure that all pupils are grasping the material under discussion. Encourages questions when pupils begin to look puzzled, and detects pupils who are not participating.

S

T

X — Insufficient evidence

Y — Inappropriate for this session

COMMENTS AND ANECDOTAL EVIDENCE (Use back of sheet)

Count of total number os student questions and comments (check one)

___0 ___1-5 ___6-10 ___11-15 ___16-20 ___21-25 ___26 or more

(6) USE OF TEACHING METHODS

Types of Methods

1. recitation
2. review lesson
3. drill lesson
4. discussion
   - A. teacher led
   - B. pupil led
5. demonstration
6. lecture
7. problem solving situation
8. teacher-pupil planning
9. guided activity
   - A. independent
   - B. small group
   - C. large group
10. Other (specify)
    - A. _____
    - B. _____

Analysis of Methods Used

1. Specific method used (code number, above).
2. Percentage of total class time devoted to each.
3. Code letter for "effectiveness" of method.

	a	b	c
	2		
	100		
	P		

Effectiveness of Methods

A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T

The method is poorly adapted to the size of the group, the teacher not sufficiently familair with it to have control of the situation, and it is not in keeping with the apparent objectives of the lesson.

The method may be poorly suited to the occasion but has some value because of the adaptness of the teacher, or it may be poorly put to use and still have some worth through its inherent suitability to the class size, objectives, and subject matter.

Method and the use to which it is put appear geared to the objectives in having employed it. Some limitations are evident, e.g., lecture given may be appropriate for class size and apparent objective, but may have been more effective by use of duplicated material.

Subject matter, group size, objectives, physical setting, and nature of the group are all well served by the selected method. Appropriate materials are used to supplement the method; e.g., a motion picture is used effectively to illustrate points being presented. No ineptness in use of method can be detected.

X _____ Insufficient evidence

Y _____ Inappropriate for this session

COMMENTS AND ANECDOTAL EVIDENCE
(Use back of sheet)

Apparent Objective(s)

_____ Information

_____ Skills

_____ Understanding

_____ Attitudes

(7) USE OF "CHALLENGE"

A
B
C
D
E
F
G
H
I
J
K
L
M
N
X
O
P
Q
R
S
T

At no time during the class does the teacher ask questions for which he expects answers. If questions are asked of the teacher, he may or may not answer them, but he does not turn any back to the group.

There is some use of challenge. However, questions are asked in a routine and/or formal, and/or threatening, and/or unrelated fashion.

There is an effort to use questions to guide learning. However, some points may be overlabored, poorly phrased or timed challenge may cause some uneasiness; or the questions might be asked more according to a pre-determined system than the needs of individuals.

There is considerable interaction between teacher and student. There is a freedom to respond or not respond; and responses are not 'judged', but employed to aid further learning.

X Insufficient evidence.

Y Inappropriate for this session.

COMMENTS AND ANECDOTAL EVIDENCE (Use back of sheet)

APPENDIX B

LIST OF ORIGINAL PARTICIPANTS

LEARNING PROCESS WORKSHOP

PARTICIPANTS

Name	Home Address	School Area	Phone
Bednarchik, John	264 Skillen Street Buffalo, N. Y. 14207	Cleveland Hill	877-6840
Beris, Jerome	8 Ronadl Drive Lancaster, N. Y. 14086	Harris Hill Elem.	683-1534
Boardway, Arlene	Box 141 Lancaster, N. Y. 14086	Alys Drive Elem.	684-7197
Canney, Maureen	313 Whitfield Ave. Buffalo, N.Y. 14220	West Seneca	823-4224
Eisele, James (Dr.)	149 Briarhurst Road Buffalo, N. Y. 14221	Coop. Board Home	634-3338 634-9638
Gibbs, Sheila	12 Alys Drive W. Depew, N.Y. 14043	Depew High	683-4179
Gillies, Donald	9524 Countryside Ct. Clarence Center, N.Y.	Clarence Central	741-3682
Houck, Douglas	4310 Shimerville Road Clarence, N.Y. 14031	Williamsville	633-9129
Insana, Thomas	804 24th Street Niagara Falls, N.Y.	Lancaster Senior	284-2908
Jay, Wilda	70 Greenfield Avenue Hamburg, N.Y. 14075	Frontier Elem.	NA7-9009
Jones, Lois	26 Sunnyside Drive Hamburg, N.Y. 14075	Boston Valley	649-6352
Jost, Angela	24 Crescent Avenue Buffalo, N.Y. 14214	Akron Central	835-5052
McManus, J. Daniel	47 Layton Avenue Amherst, N.Y. 14226	Maryvale Senior	836-5316
Palmer, M. Ester	9074 Lake Shore Road Angola, N.Y. 14006	Frontier Central	549-0113

Plewinski, Ronald	98 St. Joseph Street Buffalo, N. Y. 14211	Pine Hill Elem.	892-8291
Roderick, Robert	260 Clifton Parkway Hamburg, N.Y. 14075	Hamburg Jr. High	627-7281
Shanahan, John	S-5936 Benning Road West Falls, N.Y. 14170	West Seneca	662-5238
Streit, Angeline	3710 Bowen Road Lancaster, N.Y. 14086	Depew Middle	684-4113
Szabo, George K.	360 Moore Avenue Kenmore, N.Y. 14223	Cheektowaga Cent.	TF5-2856
Whiting, Monroe	334 Burroughs Drive Snyder, N.Y. 14226	Smallwood Drive	TF9-3790
Wilson, Ruth A.	478 Lakewood Pkwy. Snyder, N.Y. 14226	Cleveland Hill	TF9-1200

APPENDIX C

REFERENCE BOOKLET

(ATTACHED)

APPENDIX D

PIAGET REDISCOVERED

A Report by Eleanor Duckworth

PIAGET REDISCOVERED

A Report by Eleanor Duckworth

> "The accent must be on auto-regulation, on active assimilation - the accent must be on the activity of the subject. Failing this there is no possible didactic or pedagogy which significantly transforms the subject."
>
> J. Piaget - Ithaca, 1964

Everybody in education realizes that Piaget is saying something that is relevant to the teaching of children. For the most part he is understood to be underestimating the value of teaching. He is understood to be saying something like this: Children go through certain stages of intellectual development from birth through adolescence. These stages materialize, fully constructed, when their time has come, and there is little we can do to advance them. What we must do in education is to realize the limits of children's understanding at certain ages, and plan our teaching so it falls within these limits.

In two recent conferences, one at Cornell, one at Berkley, Piaget made clear that the implications of his psychology for education are a good deal more fecund than this. In fact, the only one of these statements that he would support is that children go through certain stages of intellectual development. Contrary to the view most often

attributed to him, he maintains that good pedagogy can have effect on this development.

I will start with the essentials of Piaget's theory of intellectual development, as presented at these conferences, and then go on to some implications for education.

Development of intellectual capacity goes through a number of stages whose order is constant, but whose time of appearance may vary both with the individual and with the society. Each new level of development is a new coherence, a new structuring of elements which until that time have not been systematically related to each other.

Piaget discussed four factors contributing to this development - nervous maturation, encounters with experience, social tramsmission, and equilibration of auto-regulation. While the first three do indeed play a role, Piaget finds each of them insufficient in itself. His findings lead him to conclude that an individual's intellectual development is a process of equilibration, where the individual himself is the active motor and coordinator of his own development.

What the first three factors have in common is that the indivudal is passive. Something is done <u>to</u> him - his physiological system matures, or he is presented with physical or linguistic material to absorb. But intellectual development is not this passive. Piaget finds it necessary to call upon the factor of the individual's own activity. An individual comes to see the world as coherent, as structured,

to the extent that he acts upon the world, transforms it, and succeeds in coordinating these actions and transformations.

Development proceeds as partial understandings are revised, broadened, and related to one another. Piaget's model for this is one of auto-regulation to attain even broader and more stable equilibrium in the individual's dealing with this world.

As far as education is concerned, the chief outcome of this theory of intellectual development is a plea that children be allowed to do their own learning. Piaget is not saying that intellectual development proceeds at its own pace no matter what you try to do. He is saying that what schools usually try to do is ineffectual. You cannot further understanding in a child simply by talking to him. Good pedagogy must involve presenting the child with situations in which he himself experiments, in the broadest sense of that term - trying things out to see what happens, manipulating things, manipulating symbols, posing questions and seeking his own answers, reconciling what he finds one time with what he finds at another, comparing his findings with those of other children.

Beyond this general implication, Piaget does not claim to be an educator. During the course of the two conferences he made no single discourse on pedagogy. But he made a number of points which I have gathered together here. Most of them are not new ideas; but it seems to me that it is of

importance, somehow, to realize that this is what he is saying.

I shall start with comments on one or two teaching practices often associated with Piaget's name, because of some relationships to his research. One is the head-on attack on a specific notion in a precise and limited way. This is the type of attack engaged in by psychological experimenters, in trying to teach 4 and 5 year olds, for example, that the amount of liquid stays the same when poured into a glass of a different shape.

(In Piaget's own research, when a child asserts that the same amount of liquid is conserved, this is taken as an indication of a certain structure of mental operations. For this reason, performance on this task is an important indicator of intellectual level.)

Piaget sees little sense in intensive specific training on tasks like this one. His feeling is that no learning of significance will take place. Even if the child does manage to learn something about this situation, the learning is not likely to have a general effect on his level of understanding.

But notice that he is not thereby saying that a young child's mental structure cannot be touched. He is only saying that this type of specific attack is rather trivial. Modifying a child's effective set of mental operations depends on a much wider, longer lasting and fundamental

approach, which involves all of the child's activity.

Piaget amplified this point about the importance of investigative activity in general in reply to a question on cross-cultural comparisons. Montreal psychologists, using Piaget's material as tests, found children in Martinique to be delayed several years over children in Montreal. Similarly, there is a significant delay of children in Iranian villages over children in Iranian cities. Piaget was asked what factors in the adult societies might account for these differences.

In reply, he first pointed out that the schools in Martinique follow the same curriculum as the schools in France, so that scholastic preparation was not likely to account for the difference. Then he quoted the psychologist who had done the research in Martinique, who pointed out that the climate is fine, agriculture flourishes and living poses a few problems. There seems to be little call for questioning and struggling for solutions - general, little call for either physical or intellectual activity. Piaget speculated that this could be the significant factor.

Another pedagogical approach often associated with Piaget's name has to do with teaching the "structure" of a subject matter area. This has been associated with him because of the importance that mental structures play in his psychological theory. The word "structure" is seized upon as the link.

The pedagogical idea is that children should be taught the unifying themes of a subject matter area, after which they will be able to relate individual items to this general structure. (This seems to be what Bruner often means by 'teaching the structure' in The Process of Education.) Commenting on this procedure, Piaget made the following statement:

"The question comes up whether to teach the structure, or to present the child with situations where he is active and creates the structures himself... The goal in education is not to increase the amount of knowledge, but to create the possibilities for a child to invent and discover. When we teach too fast, we keep the child from inventing and discovering himself... Teaching means creating situations where structures can be discovered; it does not mean transmitting structures which may be assimilated at nothing other than a verbal level."

Piaget addressed two remarks to problems of teacher training. The first is that adults, as well as children, can learn better by doing things than by being told about them. He was talking about teachers in training, when he said, "If they read about it, it will be deformed, as is all learning that is not the results of the subject's own activity."

The second is that prospective teachers ought to spend some time questioning children in a one-to-one situation, in

order to realize how hard it is to understand what children mean, and even more, how hard it is to make oneself understood by children. Each prospective teacher should work on an original investigation to find out what children think about some problem - and thus be forced to phrase the problem and establish communication with a number of different children. Facing the difficulties of this type of research will have a sobering effect on a teacher who thinks he is talking successfully to a whole class of children at once.

Permit me one other point of psychological theory, as context for another of Piaget's remarks. Piaget sees the process of equilibration as a process of balance between assimilation and accommodation in a biological sense. An individual assimilates the world - which comes down to sayin he sees it in his own way. But sometimes something presents itself in such a way that he cannot assimilate it into his view of things, so he must change his view - he must accommodate if he wants to incorporate this new item.

The question arose in this conference as to whether school situations could lead a child to accommodate wrongly - that is, to change his ideas on the wrong basis. Piaget replied: "This is a very interesting question. This is a big danger of school - false accommodation which satisfies a child because it agrees with a verbal formula he has been given. This is a false equilibrium which satisfies a child by accommodating to words - to authority and not to objects

as they present themselves to him... A teacher would do better not to correct a child's schemas, but to provide situations as he will correct them himself."

Here are a few other remarks at random:

"Experience is always necessary for intellectual development... But I fear that we may fall into the illusion that being submitted to an experience (a demonstration) is sufficient for a subject to disengage the structure involved. But more than this is required. The subject must be active, must transform things, and find the structure of his own actions on the objects."

"When I say "active", I mean it in two senses. One is acting on material things in social collaberation, in a group effort. This leads to a critical frame of mind where children must communicate with each other. This is an essential factor in intellectual development. Cooperation is indeed co-operation."

(The role of social interaction is important in Piaget's theory of development. A characteristic phenomenon in intellectual difficulties of pre-school children is that they have difficulty conceiving of any point of view other than their own. Coming to an awareness that another child sees something differently from the way he sees it plays an important role in bringing a child to accommodate, to

rebuild his point of view, and come closer to a coherent operational structure.)

"The best idea I have heard from a pedagog at the International Bureau of Education in Geneva was made by a Canadian. He said that in his province they had just decided every class should have two classrooms - one where the teacher is, and one where the teacher isn't."

"The teacher must provide the instruments which the children can use to decide things by themselves. Children themselves must verify, experimentally in physics, deductively in mathematics. A ready-made truth is only a half-truth."

One participant asked what Piaget thought of having children of different ages in a class together. He replied that it might be helpful especially for the older ones. They could be given some responsibility of teaching younger ones. "Nobody knows better than a professor that the best way to learn something is to teach it."

"Yes, the element of surprise is an essential motor in education and in scientific research in general. What distinguishes a good scientist is that he is amazed by things which seem natural to others. Surprise plays an important role; we might well try to develop an aptitude for surprise."

"Words are probably not a short-cut to a better understanding... The level of understanding seems to modify the language that is used, rather than vice versa... Mainly, language serves to translate what is already understood; or else language may even present a danger if it is need to introduce an idea which is not yet accessible."

"The principle goal of education is to create men who are capable of doing new things, not simply of repeating what other generations have done. Men who are creative, inventive, and discoverers. The second goal of education is to form minds which can be critical, can verify, and not accept everything they are offered. The great danger today is of slogans, collective opinions, ready-made trends of thought. We have to be able to resist individually, to criticize, to distinguish between what is proven and what is not. So we need pupils who are active, who learn early to find out by themselves, partly by their own spontaneous activity and partly through material we set up for them; who learn early to tell what is verifiable and what is simply the first idea to come to them."

DEVELOPMENTAL STAGES OF INTELLIGENCE

1. Sensory Motor (Birth - 2 years)

    a. Before he can effectively use language the infant manipulates, receives impulses, has a high reliance on others and imitates.

    b. Child can only see sequence not its causes - learning for the most part is accidental.

2. Pre-Operational Stage (2 - 7 years)

    a. Egocentrism of the child.

    b. Lacks skills of hypothesizing.

    c. Centration - child zero's in on the central (most striking) feature of an experience.

    d. Barely able to cope with primary abstractions.

    e. Has difficulty with inclusion and exclusion.

    f. Has little concept of mass, weight, and volume.

3. Concrete Operation (7 - 11 years)

    a. Has the ability to deal effectively with classes along a single dimension.

    b. Has ability to perceive that two separate objects can be related to a third - primitive deductive system.

    c. Simple deductive system - when operations are demonstrated in a concrete situation.

4. Formal Operation (12 - 16)

    a. Manipulates symbols rather than things.

    b. Deals with true causality.

    c. All adult reasoning is present - at least in early form.

APPENDIX E

WORKSHEET FOR COGNITIVE THEORY OF INSTRUCTION

PRINCIPLES OF LEARNING

1. Learner seeks stimulus.

2. Learner's perception of the situation is more important than the situation itself.

3. Learning depends upon what the learner does.

4. Individual learns to learn as he learns anything else.

5. Learner is self-directed and his self-direction tends to be healthy.

****

Learning is:

Individualized

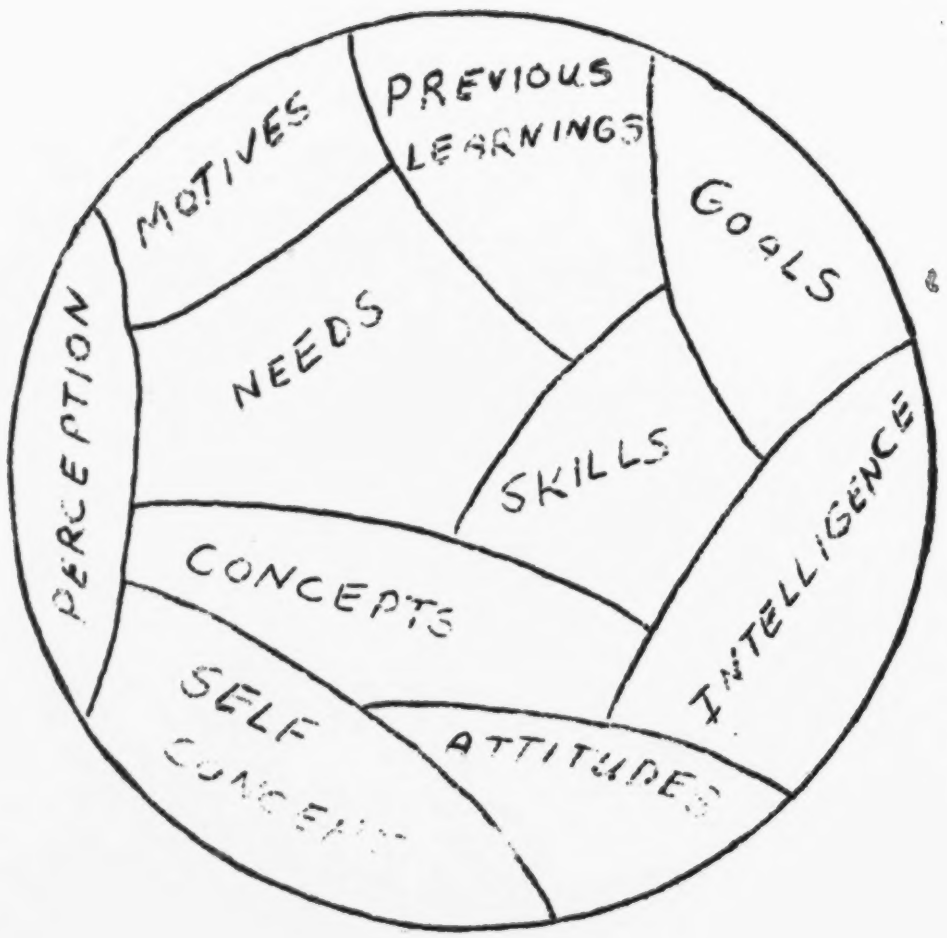
Continuous

Inevitable

Goes on in terms of individual's own current motivational system

****

Experiencing is interaction between individual and environment. Learning occurs because of that experience --- his behavior changes as a result of interaction.



MODEL OF COGNITIVE STRUCTURE

PERCEPTION

CONCEPTS STRUCTURE

SELF-CONCEPT

ATTITUDES

NEEDS

MOTIVES

GOALS

INTELLIGENCE

SKILLS

PREVIOUS LEARNINGS AND RECOLLECTIONS OF PAST EVENTS

MODEL OF THE TEACHING PROCESS

1. Identifies the expected outcomes of the process.

2. Analyzes the student and makes decisions about the student's present stage of learning.

3. Specifies the objectives of teaching in the light of the first activities.

4. Selects information and materials and makes decisions about methods.

5. Involves the student in activities presumed to lead to teaching.

6. Directs and guides the learning activities.

7. Provides situations for using the learnings involved.

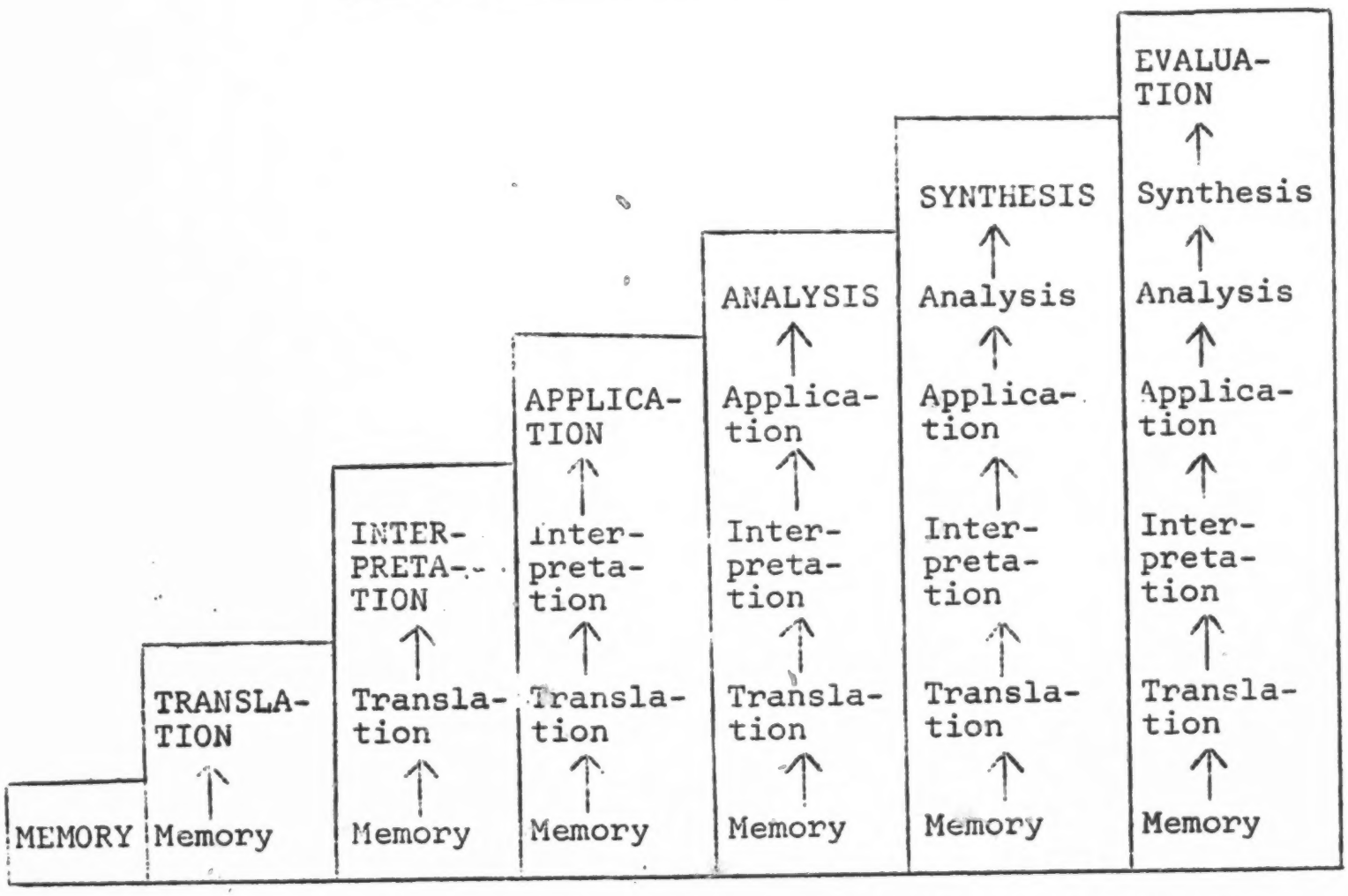
8. Evaluates the outcomes of the process.

APPENDIX F

A TAXONOMY OF QUESTIONING

TAXONOMY - a special system of classification in which the classes are sequential and cumulative.

THE TAXONOMY OF QUESTIONING



(from the book Classroom Questions: What Kinds? by Norris M. Sanders., Harper and Row, New York, 1966).

1. Memory: The student recalls or recognizes information.

2. Translation: The student changes information into a different symbolic form or language.

3. Interpretation: The student discovers relationships.

4. Application: The student solves a lifelike problem; he must identify the issue and select the proper skills.

5. Analysis: The student solves a problem in the light of conscious knowledge and the parts and forms of thinking.

6. Synthesis: The student solves a problem with original, creative thinking.

7. Evaluation: The student makes a judgment of good or bad, right or wrong, according to standards he designates.